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(54) Apparatus for feeding and tightening threaded parts

Vorrichtung zum Zuführen und Spannen von Gewindeteilen

Dispositif pour alimenter et tendre des éléments filetés

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to feeding and tightening of threaded parts such as bolts and nuts to, depending on the parts, threaded holes or bolts (hereinafter called objects) at a desired location, with the purpose of realising generally used bolt runners or nut runners as automatic machines.

Prior Art

US Patent No: 4815343 (United Container Machinery Group) describes a reciprocating rotatable feed rod with a part-receiving socket hole and a selectively closable groove for clamping and releasing the part.

The Applicant's own earlier European Patent No: 0 491 484 (relevant under Art 54(3) EPC) discloses an apparatus for feeding and tightening a threaded part comprises a rotary retractable feed rod having a driving socket at one end for receiving a ferromagnetic part; a holding member having a groove for receiving and holding the part fed from the part feed passage, the holding member being movable between a first position remote from the feed rod and a second position in which the held part is coaxial with the feed rod; a driving means for moving the holding member between the first and second positions; a reciprocating plate for selectively closing the groove, thereby releasably confining and restraining the part held by the holding member, the plate having a magnet embedded therein for securing the position of the part against the plate when the part is received in the groove.

In such apparatus, a threaded part is held by a rotatable feed rod and carried to the object by moving along a specified path, whilst avoiding surrounding machines and devices.

When the feed rod moves along such a specified path with the threaded part at its front end, the feed rod moves in the axial direction, and therefore the threaded part being held is caused to move suddenly or stop abruptly, and can be accidentally shaken off the front end of the feed rod or deviated in position due to the inertial force. Such part dislodgement problems are particularly significant in a robotic apparatus.

SUMMARY OF THE INVENTION

According to the invention:

an apparatus for feeding and tightening a threaded part comprises a rotary retractable feed rod having a driving socket at one end for receiving a ferromagnetic part;

a holding member having a groove for receiving and holding the part fed from the part feed passage, the holding member being movable between a first position remote from the feed rod and a second position in which the held part is coaxial with the feed rod;

a driving means for moving the holding member between the first and second positions;

a reciprocating plate for selectively closing the groove, thereby releasably confining and restraining the part held by the holding member, the plate having a magnet embedded therein for securing the position of the part against the plate when the part is received in the groove;

and supplementary braking means for applying a positive mechanical braking contact to the part separately from and independently of the captive restraint provided by the groove and reciprocating plate and the magnet, to inhibit rotation of said part held by the holding member upon transfer to the driving socket.

This multi-element part retention addresses the part dislodgement problem. Thus the part is in a restrained state until reaching the vicinity of the object, and therefore, holding of the part is not disturbed by the inertial force. Besides, since the part is brought close to the object in the restrained state, the part will not be shaken off or deviated in position if the holding member may start quickly in any direction or stop abruptly, and therefore it is possible to operate normally without any trouble if applied in a robot or similar apparatus. Moreover, since the part is restrained by the restraining member is brought into coaxial relationship with the feed rod, the part may be inserted very smoothly into the socket hold of the feed rod.

Since the brake force on the rotation is acting on the part, when inserting the threaded part into the socket hole of the rotating feed rod, the part is smoothly fitted into the socket hole in a short time without rotating together. The brake force for arresting the rotation of the part is applied by a pushing member, in conjunction with a magnetic attractive force on the part, such as a bolt received in the groove of the holding member or a nut put on the holding member

The supplementary braking means may comprise an air cylinder with a piston rod which is pressed to the part held by the holding member.

Alternatively, the braking means may comprise a pushing pin which is pressed to the part held by the holding member.

The driving means of the apparatus may cause the holding member to move linearly between the first and second positions.

In an alternative embodiment, the driving means

causes the holding member to rotate between the first and second positions.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a side view in part section of an apparatus embodying the invention.
Figure 2 is a sectional view taken along the line (2) - (2) in Figure 1.
Figure 3 is an arrow view (3) in Figure 1.
Figure 4 is a sectional view taken along the line (4) - (4) in Figure 1.

The embodiments illustrated in Figures 5 through 7 are included for completeness of disclosure and a better perspective of the overall topic, but do not form part of the invention claimed.

Figure 5 is a plan view of holding member in a chuck form.
Figure 6 is a longitudinal sectional view showing another embodiment of the invention.
Figure 7 is a plan view of a holding member in Figure 6.
Figure 8 is a side view in part section of a further embodiment.
Figure 9 is a sectional view taken along the line (9) - (9) in Figure 8.
Figure 10 is a longitudinal sectional view showing the mechanism for applying a brake force.
Figure 11 is a side view in part in section of a still further embodiment of the invention.
Figure 12 is a sectional view taken along the line (12) - (12) in Figure 11.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring first to an embodiment shown in Figure 1 through Figure 4, the object part in this embodiment is a bolt 1, and numeral 2 denotes the hexagonal head, and 3 shows the shaft part. A feed rod 5 of rotatable retractable type has a socket hole 6 formed in its front end for receiving the head 2 end, and this socket hole 6 may advantageously have a dodexagonal or octagonal shape, rather than hexagonal shape, for smoothly receiving and engaging the hexagonal head. Deep inside the socket hole 6, a magnet (permanent magnet) 7 is embedded and by its attractive magnetic force, the head 2 is prevented from dropping off the socket hole 6.

The feed rod 5 is connected to a rotary motor 8 driven by compressed air, current or the like (air hose, electric wire and others are not shown), and a slide piece 9 fixed to the motor 8 moves back forth along a guide rail 10. As is clear from Figure 4, a dovetail groove 11 is formed in the guide rail 10, and the slide piece 9 is slidably inserted therein. This guide rail 10 is welded to a fixing piece 13 attached to a stationary member 12, and extends along the direction in which the feed rod 5 makes reciprocating movements. An air cylinder is attached to the fixing piece 13, and its piston rod 15 is coupled with the rotary motor.

The feed rod 5 is slidably inserted in a guide tube 16, and a part-feed pipe 18 having a part feed passage 17 is integrally assembled with the guide tube 16. They are shown as being welded together through a coupling 19 in this embodiment. The part feed pipe 18 is installed to form an acute angle to the axial line of the feed rod 5 as shown. Alternatively, it may be in parallel, instead of at an acute angle to the feed rod. The part feed pipe 18 is welded to the coupling plate 19, and the lower surface of the coupling plate is flush with the lower end of the guide tube 16 as shown in the drawing. A through hold 20 communicating with the part feed passage 17 is formed in the coupling plate 19.

A fixing plate 21 is welded to the coupling plate 19, and an air cylinder 22 is attached thereto, and a holding member 24 is coupled with its piston rod 23. The holding member 24 is a nearly rectangular solid structure as shown in the drawing, and is designed to move back and forth while sliding on the lower surfaces of the coupling plate 19 and of the guide tube 16. A groove 25 for receiving the bolt 1 is formed in the surface of the holding member 24, opposite to the piston rod 23. This groove 25 is composed of a broad part 26 for receiving the head 2 and a narrow part 27 for receiving the shaft 3, and is in register with the through hole 20 when the holding member 24 is at the position as shown in Figure 1. As shown in Figure 2, an L-shaped bracket 28 is welded to the holding member 24, and a closure member 31 is fitted to a piston rod 30 of an air cylinder 29, fixed to the bracket so that the forward and backward motions of the piston rod 30, cause the closure member 31 to open and close the narrow part 27 of the groove 25. Inside the closure member 31, is embedded a magnet (permanent magnet) 32 for positioning the bolt 1 coming into the groove 25.

A variety of means for applying a brake force to the bolt 1, may be available, and an example of applying a pressing force to the shaft part 3 is shown here. That is, as shown in Figure 3, a fixing piece 33 is welded to the bracket 28 in an oblique direction, and an air cylinder 34 is attached thereto, and its piston rod 35 extends through a hole 36 formed in an oblique direction in the holding member 24 thereby pressing the shaft part 3. In Figure 2, for the ease of understanding, the air cylinder 34 and piston rod 35 are indicated by double dot chain line. A feed hose 37 of a flexible synthetic resin is connected to the pens feed pipe 18 (Figure 1).

An air cylinder 39 as a driving means for reciprocating movements is firmly fixed through a bracket 38 to the rotary motor 8 and its piston rod 40 is coupled with an arm member 41 welded to the guide tube 16. As the piston rod 40 retracts , the guide tube 16 slides upward relative to the feed rod 5 which remains still so that the part feed pipe 18, holding member 24 and air cylinder 34 are raised in unison, resulting in the feed rod 5 pro-

jecting downward.

The sequence of the steps of the method according to this embodiment will now be described. In the initial state as shown in Figure 1, the holding member 24 is in the position retracted to the left as shown while the closure member 31 is in the advanced position as shown. In such state, the bolt 1 is fed through the part feed pipe 18 and the shah part 3 rushes into the narrow groove 27, so that the bolt is positioned as indicated by solid line in Figure 1. When the shaft part 3 gets into the narrow groove 27, it is securely restrained and thus properly positioned by the closure member 31 and magnet 32. Then the holding member 24 is advanced to the right by the air cylinder 22, so that the head 2 comes just beneath the socket hole 6, that is, the bolt 1 is coaxial with the feed rod 5 as indicated by double dot chain line in Figure 1. The piston rod 35 is pressed to the shaft part 3 when the bolt 1 is received in the holding member 24 or when the holding member 24 is advanced to the position as shown by double dot chain in Figure 1, so that a brake force is applied to the bolt 1.

Subsequently, the air cylinder 14 is actuated to move the bolt 1 to the vicinity of a desired location, while the bolt 1 is restrained bye the closure member 31, with the relative positions of the bolt 1 and feed rod 5 shown by double dot chain line in Figure 1 remaining unchanged. Then the piston rod 40 of the air cylinder 39 is slightly withdrawn, so that the bolt 1 is moved toward the rotating feed rod 5, allowing the head 2 to be inserted into the socket hold 6 and attracted and held by the magnet 7. In this case, since the rotation of the bolt 1 is being arrested by the brake force which is due to both the piston rode 35 and magnet 32, it is smoothly fitted into the socket hole 6 without rotating together with the feed rod 5. Subsequently, the closure member 31 retreats, and the holding member 24 returns to the position indicated by solid line in Figure 1, whereupon the piston rod 40 of the air cylinder 39 draws back, and only the feed rod 5 is projected. Later, the closure member 31 advances again so as to be ready for receiving the next bolt. By the advancement of the piston rod 15 of the air cylinder 14, the feed rod 5, holding member 24, air cylinders 22 and 39 advance in unison, thereby screwing the bolt 1 into the threaded hole at the desired location.

This series of action as described may be easily carried out by the combination of the known electromagnetic ar control valves and control circuits, for supply and discharge of working air into each cylinder, and hence the explanation thereof is omitted herein. In the foregoing embodiments, the air hoses connected to the air cylinders are not shown for simplicity.

When the related members are moved together to the vicinity of the desired location by the output of the air cylinder 14, in the case previously described the holding member 24 is in the state indicated by single dot chain line in Figure 1, but it may be also possible to move then with the holding member in the state indicated by the solid line.

The embodiments illustrated in Figures 5 through 7 do not form part of the invention claimed.

In Figure 5, the entire holding member 24 is in the form of a chuck mechanism in which a pair of jaws 43, 44 are pivotally mounted on a base plate 42 affixed to the front end of the piston rod 23, via pins 45, 46 and are adapted to grasp the shaft part 3 of the bolt between the opposing ends thereof. Between the rear ends of the jaws 43, 44, a coil spring 47 is disposed so as to grip the shaft part 3 by applying a brake force thereto.

Referring now to the embodiment shown in Figure 6 and Figure 7, the part in question here is a nut 49 having a flange 48, in which the part feed pipe 18 is installed nearly in the horizontal direction, and the nut 49 is transferred from the end of the pipe 18 to the holding member 24 waiting in near abutment. A recess 50 is formed in the upper surface of the front end of the holding member 24 for receiving the flange 48, its peripheral wall containing an arc 51 (see Figure 7) for positioning the circular flange 48. A magnet (permanent magnet) 52 is embedded in the recess 50. The nut 49 is attracted to the magnet 52 and receives the restraining action as mentioned above in relation to the magnet 32. As a result, a resistance to sliding in the rotating direction, or the brake force as mentioned above is exerted. The part feed pipe 18 is welded to the guide tube 16 through a bracket 53, and the holding member 24 is slidably inserted in a guide pipe 54, which in turn is welded to the guidetube 16 through a bracket 55. The remainder of the structure and its operation are similar to those as in the Figure 1 embodiment and detailed description thereof is omitted.

In the embodiment in Figure 1, as described in detail above, the holding member 24, together with the closure member 31 is advanced close to the desired location in unison with the feed rod 5 without varying the relative position of the former with respect to the latter and later the holding member 24 is moved in the axial direction of the feed rod 5, allowing the head 2 to be fitted into the socket hole 6, then the holding member 24 is further raised until the feed rod 5 is relatively projected. Alternatively, after the holding member and the feed rod are advanced in unison to the vicinity of the desired location, only the feed rod 5 may work in two-step stroke. A practical example thereof will be described with reference to Figure 1 with some modification. In short, coupling of the rotary motor 8 and air cylinder 39 is abolished, and the air cylinder 39 is fitted to the stationary member. When the holding member 24 and the feed rod advance together without varying their relative position, the piston rod 40 of the air cylinder 39 is also extended in harmony with the operation of the air cylinder 14, and the feed rod 5 is advanced in two-step stroke by the air cylinder 14. In the first step stroke, the head part 2 is fitted into the socket hole 6, and then the closure member 31 retreats, and the holding member 24 returns to the left, then the feed rod 5 advances in

the second step stroke, thereby feeding and tightening the bolt into the desired location.

Though in the foregoing embodiments, the holding member 24 moves in a line back and forth, an embodiment where the holding member makes circular motion is shown in Figure 8 and Figure 9. The members function the same as in the preceding embodiments and are identified with the same reference numerals and detailed description thereof is omitted. In this case, at least a rotary arm 24 corrsonding to the holding member and rotary motor 56 withdraw independently from the feed rod 5, so that the head part of the bolt (not shown) is fitted into the socket hole 6. The rotary motor 56 may be of any of the conventional type such as motor driven, pneumatic and the like. The rotary motor 56 is fixed to the guide tube 16 through a bracket 57, and the rotary arm 24 is fitted to an output shaft 58, and the groove 25, L-shaped bracket 28, air cylinder 29 and closure member 31 are disposed at the front end part of the rotary arm 24.

The guide member 16 is allowed to slide back and forth along the feed rod 5. The air cylinder 39 is attached to the rotary motor 8 through the bracket 38, and the piston rod 40 is coupled to the bracket 41. The bracket 19 is longer than the one used in the preceding embodiments, and one end thereof is welded to the guide tube 16.

The operation of this embodiment will now be described. When the bolt (not shown) is held in the part holding unit and the rotary arm 24 rotates until the bolt becomes coaxial with the feed rod 5, the head part of the bolt is fitted into the socket hole 6 by the very slight upward stroke of the first step of the air cylinder 39. In succession, the closure member 31 retreats and the rotary arm 24 retreats, and the air cylinder 39 makes an upward stroke of the second step, so that only the feed rod 5 is projected downward from the guide tube 16. From this state, this time, the air cylinder 14 is actuated to carry and tighten the bolt to the desired location. When the air cylinder 14 is actuated, not only the feed rod 5 but also the guide tube 16, rotary motor 56, rotary arm 24, part feed pipe 18, and air cylinder 39 advance in unison without varying their relative position with respect to the feed rod 5. When tightening of the bolt is over, the air cylinder 14 retracts, and the air cylinder 39 advances, thereby coming to the state of waiting for the next bolt as shown in Figure 8.

In this embodiment, the part feed pipe 18 is shown as being coupled with the guide tube 16, but alternatively, the part feed pipe 18 may be fitted to the stationery member. That is, at least the rotary aim and the rotary motor are designed to retreat, independently from the feed rod.

In this embodiment, the bolt 1 should not rotate together with the feed rod when the head part 2 is being inserted into the socket hold 6, and therefore, it is desired that a brake force should be applied to the bolt 1 in position in the holding member 24. The arrangement for this purpose is shown in Figure 10, in which a pushing pin 59 is abutted against the shaft part 3. The pushing pin 59 is composed of a small diameter end 60 and a large diameter end 61, and is accommodated in a guide hole 62. The resilient force of the coil spring 63 is applied to the large diameter end 61, which is thereby pressed against a cam piece 64. The cam piece 64 is put in the guide hole 65 in the rotary arm 24, and is connected to a piston rod 67 of an air cylinder 66 fixed to the rotary arm 24. When the eam piece 64 is pushed up by the air cylinder 66, the pushing pin 59 is pressed to the shaft part 3 to apply a brake force thereto. When the head part 2 of the bolt 1 is firmly fitted and engaged in the socket hole 6 of the rotating feed rod 5, the bolt 1 overcomes the brake force exerted by the pushing pin 59 to rotate together with the feed rod.

In the embodiment shown in Figure 11 and Figure 12, the guide tube 16 is fixed to the stationary member 12 through a bracket 41' the feed rod 5 being slidably and rotatable inserted into the guide tube 16. The part feed pipe possessing the part feed passage 17 is firmly fixed to the stationary member 12 through a bracket 19', and a feed hose 37 extending from the parts feeder (not shown) is connected to the part feed pipe 18. The air-driven or electric-driven rotary motor 56 is also fixed to the stationary member 12 through the bracket 57', and the rotary arm 24 is coupled to its output shaft 58, and the part holding unit is formed near its front end. Various forms of the part holding unit may be adopted, and a groove 25 for receiving the bolt 1 is shown by way of example, which consists of a wide part 26 for receiving the head part 2 and a narrow part 27 for receiving the shaft part 3. When the rotary arm 24 is in the return position (Figure 12), the part holding unit is immediately beneath the feed pipe 18, with the arrangement being such that the bolt 1 coming out of the part feed pipe 18 may smoothly get into the groove 25. The L-shaped bracket 28 is welded to the front end of the rotary arm 24, and the closure member 31 is fitted to the piston rod 30 of the air cylinder 29 fixed thereto so that the retracting and advancing motion of the piston rod 30 of the air cylinder 29 causes the closure member 31 to open and close the narrow part 27 of the groove 25. Meanwhile, a magnet (permanent magnet) is embedded in the closure member 31, for positioning the incoming bolt 1.

The relative positions of the output shaft 58 and feed rod 5 are set so that the bolt 1 is positioned on the axial line of the feed rod 5 as indicated by double dot chain line in Figure 11. When the rotary arm 24 rotates in the direction of arrow (Figure 12) by a specific angle (90° in the shown embodiment).

Explaining the sequence of operation in this embodiment, the bolt 1 is fed to the narrow part 27, closed by the closure member 31 and is received and stopped in the groove 25 as shown in Figure 11. Next, the rotary arm 24 rotates by a specific angle until the bolt 1 is on the axial line of the feed rod 5, then the feed rod 5 rotates and makes a slight advancing stroke of the

first step by means of the air cylinder 29, so that the bolt head part 2 is fitted into the socket hole 6 and is held by the magnet 7. Afterwards, the closure member 31 retreats, and the rotary arm 24 retreats to the original position, then the feed rod 5 makes the second step stroke, whereby the bolt 1 reaches the threaded hole (not shown) at the desired location and is driven therein. When this operation is complete, the feed rod 5 returns to the position in Figure 1 to be ready for the next stroke.

In the embodiments explained herein, the rotary motor with the rotating output shaft is shown, but alternatively, a pivot may be affixed to the rotary arm, a lever arm fitted to the pivot and the air cylinder coupled with the arm. The control device for obtaining the sequence of operation as mentioned herein may be easily realized by the combination of the conventional electromagnetic air control valves and control circuits. The feed hose is flexible and has an extra length so as to be deflected in operation.

Claims

1. Apparatus for feeding and tightening a threaded part comprising:

   a rotary retractable feed rod (5) having a driving socket (6) at one end for receiving a ferromagnetic part (1);

   a holding member (24) having a groove (25) for receiving and holding the part fed from a part feed passage (17), the holding member being movable between a first position remote from the feed rod (5) and a second position in which the held part is coaxial with the feed rod;

   driving means for moving the holding member between the first and second positions;

   a reciprocating plate (31) for selectively closing the groove (25) thereby releasably confining and restraining the part held by the holding member, the plate having a magnet (32) embedded therein for securing the position of the part against the plate when the part is received in the groove; and

   supplementary braking means for applying a positive mechanical braking contact to the part (1) separately from and independently of the captive restraint provided by the groove (25) and reciprocating plate (31) and the magnet (32), to inhibit rotation of said part held by the holding member (24) upon transfer to the driving socket (6).

2. An apparatus for feeding and tightening a threaded part according to Claim 1,
   wherein the braking means comprises an air cylinder (34) with a piston rod (35) which is pressed to the part (1) held by the holding member (24).

3. An apparatus for feeding and tightening a threaded part according to Claim 1,
   wherein the means for applying a brake force to the part comprises a pushing pin (59) which is pressed to the part (1) held by the holding member (24).

4. An apparatus for feeding and tightening a threaded part according to any of the preceding claims,
   wherein the driving means causes the holding member to move linearly between the first and the second positions.

5. An apparatus for feeding and tightening a threaded part according to any of the preceding claims,
   wherein the driving means causes the holding member to rotate between the first and second positions.

Patentansprüche

1. Vorrichtung zum Zuführen und Festziehen eines Gewindeteils, die folgendes umfaßt:

   einen einziehbaren Drehzuführstab (5) mit einem Antriebseinsatz (6) an einem Ende zur Aufnahme eines ferromagnetischen Teils (1);
   ein Festhalteglied (24) mit einer Nut (25) zum Aufnehmen und Festhalten des von einem Teilzuführdurchgang (17) zugeführten Teils, wobei das Festhalteglied zwischen einer von dem Zuführstab (5) entfernt liegenden ersten Position und einer zweiten Position, in der das festgehaltene Teil mit dem Zuführstab koaxial ist, bewegbar ist;
   ein Antriebsmittel zum Bewegen des Festhalteglieds zwischen der ersten und zweiten Position;
   eine hin- und hergehende Platte (31) zum gezielten Schließen der Nut (25), wodurch das von dem Festhalteglied festgehaltene Teil freigebbar eingeschlossen und zurückgehalten wird, wobei die Platte einen darin eingebetteten Magnet (32) aufweist, um die Position des Teils an der Platte zu sichern, wenn das Teil in der Nut aufgenommen ist; und
   ein zusätzliches Bremsmittel zum Anlegen eines mechanischen Bremszwangskontakts an das Teil (1) separat und unabhängig von dem durch die Nut (25) und die hinund hergehende Platte (31) und den Magnet (32) bereitgestellten sicheren Zurückhalten, um eine Drehung des von dem Festhalteglied (24) festgehaltenen Teils bei der Übertragung zu dem Antriebseinsatz (6) zu verhindern.

2. Vorrichtung zum Zuführen und Festziehen eines Gewindeteils nach Anspruch 1, bei der das Bremsmittel einen Druckluftzylinder (34) mit einer Kolbenstange (35) umfaßt, die an das von dem Festhalteglied (24) festgehaltene Teil (1) gepreßt wird.

3. Vorrichtung zum Zuführen und Festziehen eines Gewindeteils nach Anspruch 1, bei der das Mittel zum Anlegen einer Bremskraft an das Teil einen Schiebestift (59) umfaßt, der an das von dem Festhalteglied (24) festgehaltene Teil (1) gepreßt wird.

4. Vorrichtung zum Zuführen und Festziehen eines Gewindeteils nach einem der vorhergehenden Ansprüche, bei der das Antriebsmittel eine lineare Bewegung des Festhaltegliedes zwischen der ersten und der zweiten Position bewirkt.

5. Vorrichtung zum Zuführen und Festziehen eines Gewindeteils nach einem der vorhergehenden Ansprüche, bei der das Antriebsmittel eine Drehung des Festhaltegliedes zwischen der ersten und zweiten Position bewirkt.

Revendications

1. Appareil pour alimenter et serrer un élément fileté, comprenant:

une tige d'alimentation rétractable rotative (5) ayant une douille d'entraînement (6) à une extrémité, destinée à recevoir un élément ferromagnétique (1);
un organe de retenue (24) ayant une gorge (25) destinée à recevoir et à retenir l'élément alimenté depuis un passage (17) d'alimentation d'élément, l'organe de retenue étant déplaçable entre une première position éloignée de la tige d'alimentation (5) et une deuxième position dans laquelle l'élément retenu est coaxial à la tige d'alimentation;
un moyen d'entraînement destiné à déplacer l'organe de retenue entre les première et deuxième positions;
une plaque à mouvement de va-et-vient (31) destinée à fermer la gorge (25) de manière sélective, en confinant et en bloquant ainsi de manière détachable l'élément retenu par l'organe de retenue, la plaque comprenant un aimant (32) noyé dans celle-ci, destiné à fixer l'élément en position contre la plaque lorsque l'élément est reçu dans la gorge; et
un moyen de freinage supplémentaire destiné à appliquer un contact de freinage mécanique positif à l'élément (1) séparément et indépendamment du blocage captif réalisé par la gorge (25) et la plaque à mouvement de va-et-vient (31) et par l'aimant (32), afin d'inhiber la rotation dudit élément retenu par l'organe de retenue (24) lors du transfert à la douille d'entraînement (6).

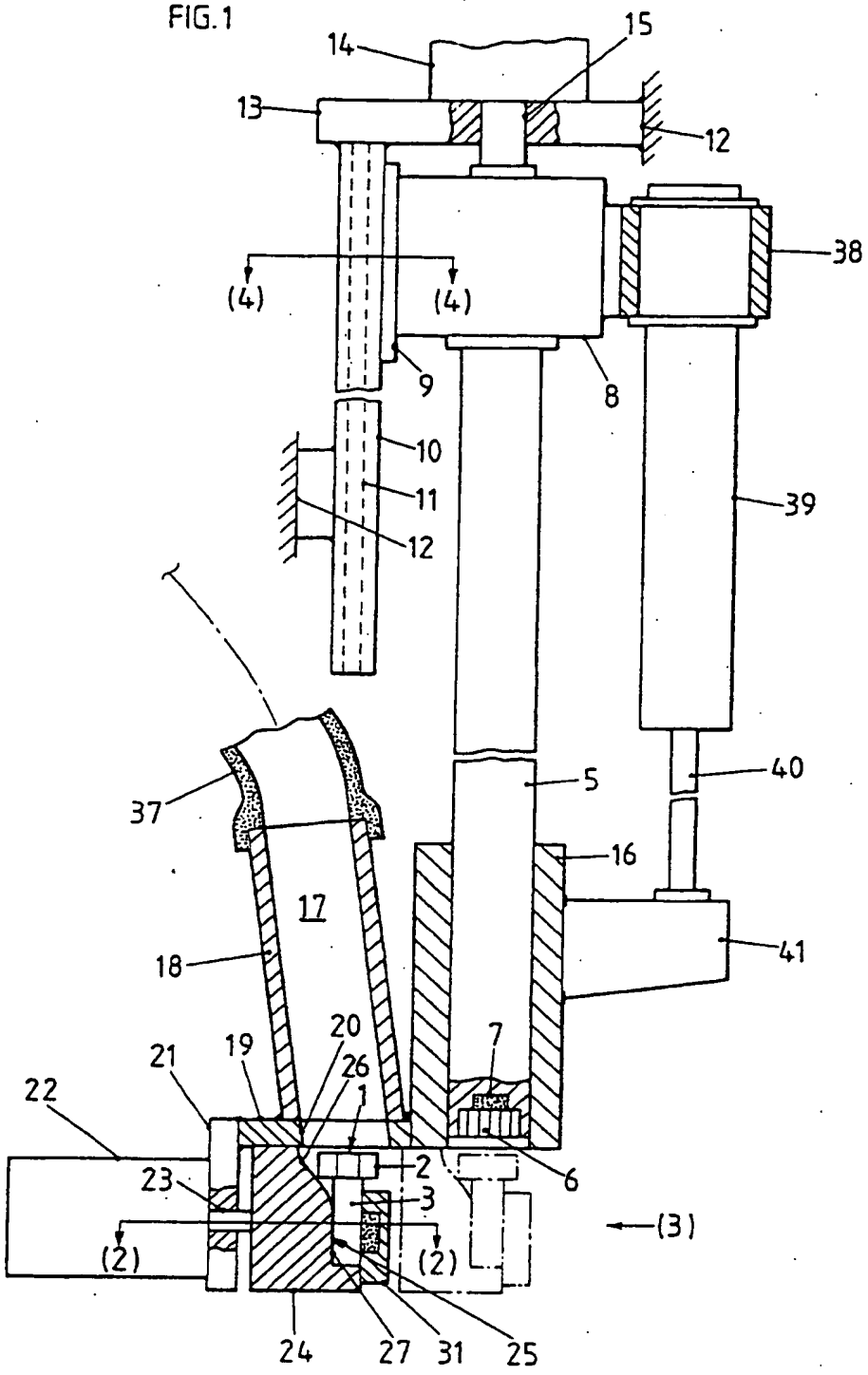
2. Appareil pour alimenter et serrer un élément fileté selon la revendication 1, dans lequel le moyen de freinage comprend un vérin pneumatique (34) avec une tige de piston (35) qui est pressée contre l'élément (1) retenu par l'organe de retenue (24).

3. Appareil pour alimenter et serrer un élément fileté selon la revendication 1, dans lequel le moyen pour appliquer une force de freinage à l'élément comprend une broche de poussée (59) qui est pressée contre l'élément (1) retenu par l'organe de retenue (24).

4. Appareil pour alimenter et serrer un élément fileté selon l'une quelconque des revendications précédentes, dans lequel le moyen d'entraînement fait se déplacer linéairement l'organe de retenue entre les première et deuxième positions.

5. Appareil pour alimenter et serrer un élément fileté selon l'une quelconque des revendications précédentes, dans lequel le moyen d'entraînement fait tourner l'organe de retenue entre les première et deuxième positions.

FIG.1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23
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(3)
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24
27
31
25

FIG. 2

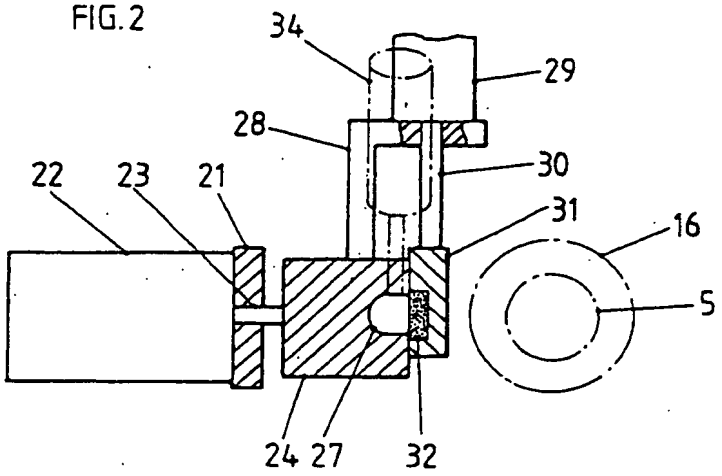


FIG. 3

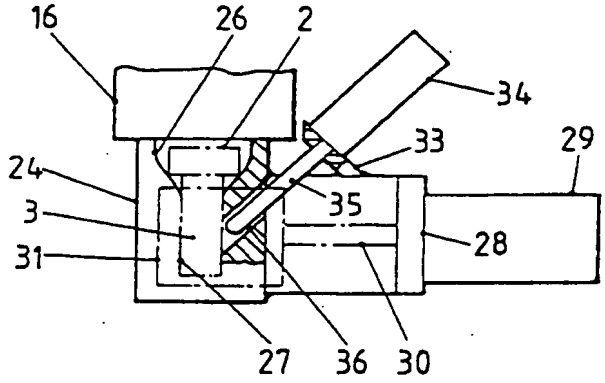


FIG. 4

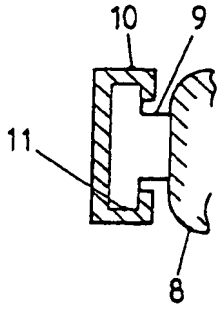


FIG. 5

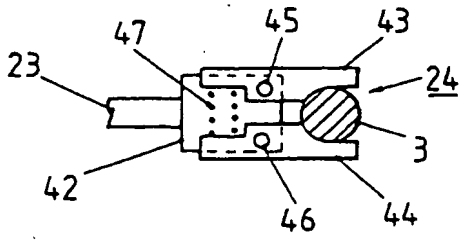
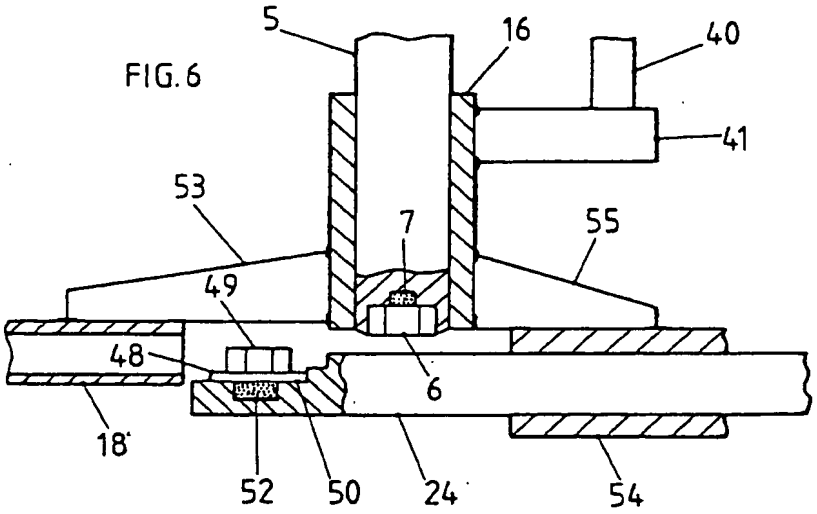


FIG. 6



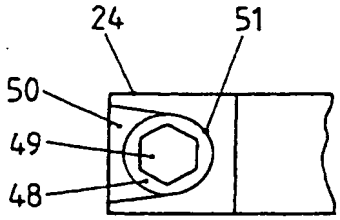
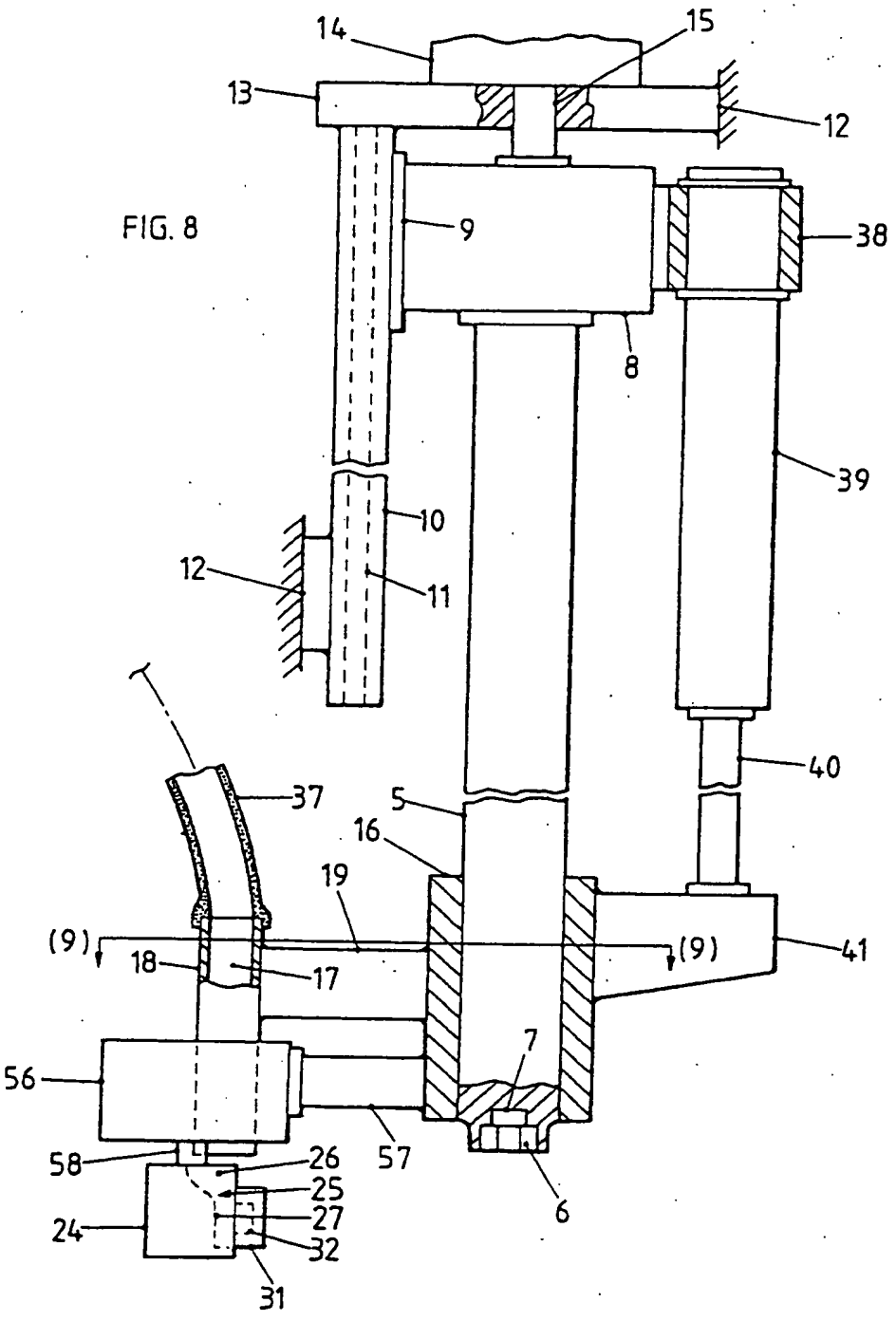


FIG. 7

FIG. 8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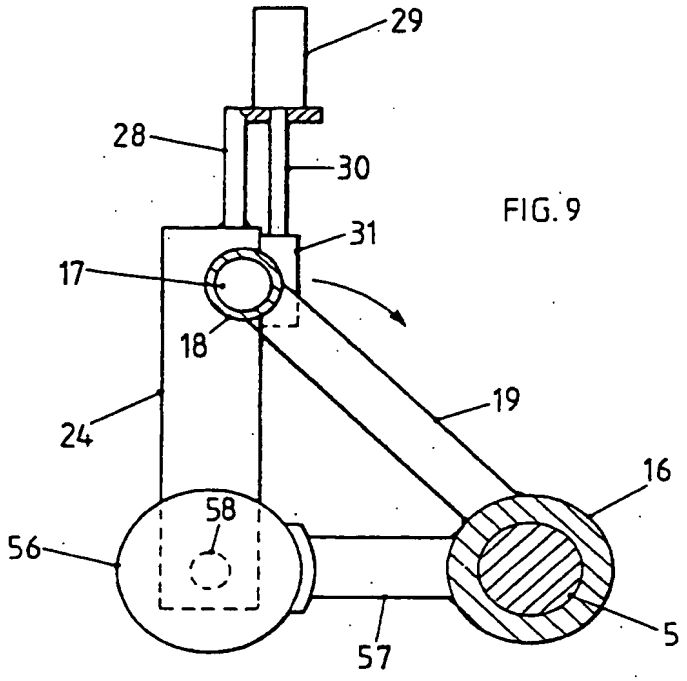
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FIG. 9

FIG. 10

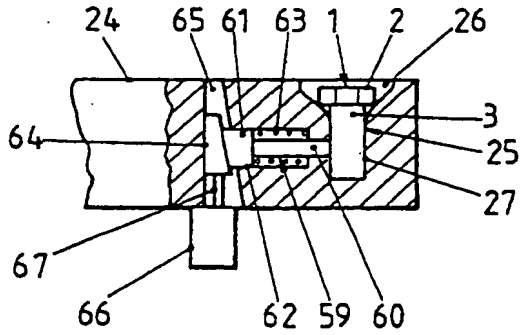
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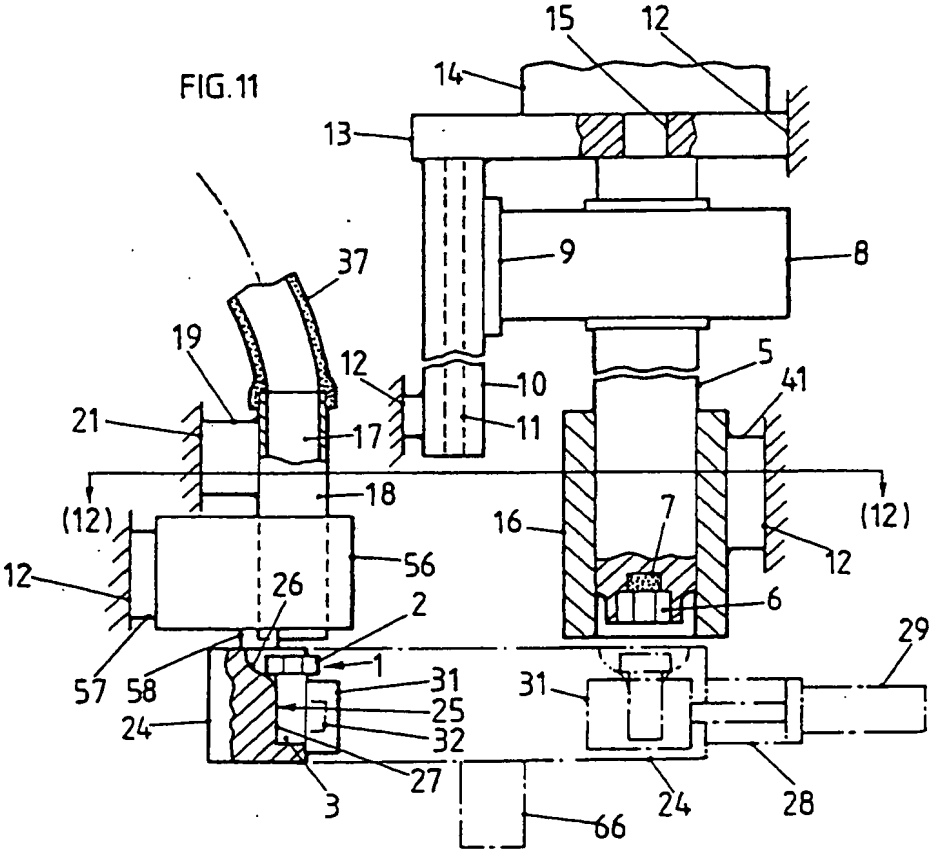
FIG.11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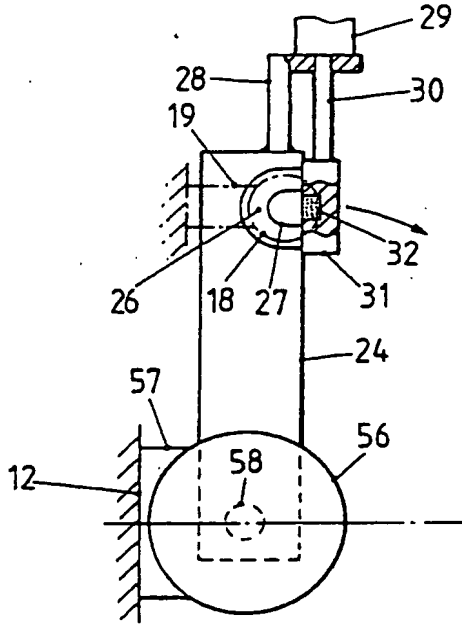
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FIG.12